

**REMARKS**

Favorable action on the merits is solicited.

Claims 19-24 and 31-38 were pending in this application when last examiner and stand rejected.

The RCE automatically enters the amendments in the after final response filed February 10, 2009.

Claim 31 is amended in a non-narrowing manner to recite proper antecedent basis for the claim language.

New claim 39 has been added that corresponds to claims 19 and 31. New claims 39-44 have been added. New claims 39-41 depend on claim 19 and further specify the properties of the resultant soluble branched polymers or the purified branching enzyme. Support can be found throughout the disclosure, for instance, at page 7, lines 15 to page 8, line 2, page 14, line 2 to page 15, line 20 and claim 31. New claim 42 is combination of claims 19, 21, and 31. Claims 43 and 44 correspond to claims 40-41 but depend on claim 42. Further support can be found throughout the disclosure, for instance, at page 7, lines 15 to page 8, line 2, page 14, line 2 to page 16, line 20, and the Examples 1-4 on pages 17-24. No new matter has been added.

The Advisory Action maintained the enablement rejection of claims 19-24 under 35 U.S.C. § 112, first paragraph on the basis the specification fails to enable the full scope of the claims. The Official Action contends that

the scope of the claims includes all branching enzymes, and the specification does not identify how to make and use the full range of branching enzymes.

Applicants herein reiterate the arguments set forth in the after final response of February 10, 2009 with respect to the enablement rejection of claims 19-24.

Again, it is respectfully submitted that the term "branching enzyme" is a well recognized and conventional material/reagent used in the industry. An example of a conventional branching enzyme includes those of the EC 2.4.1.18 type. As argued in the last response, such branching enzymes are readily obtainable as evidenced by the disclosure and the knowledge in the art. For example, in a previous response, Applicants noted the following website, [http://en.wikipedia.org/wiki/Glycogen\\_branching\\_enzyme](http://en.wikipedia.org/wiki/Glycogen_branching_enzyme), which provides the following well-known definition of branching enzyme:

"Every 10 to 14 glucose units a side branch with an additional chain of glucose units occurs. The side chain attaches at carbon atom 6 of a glucose unit, and the linkage is termed an alpha-1,6 glycosidic bond. To form this connection a separate enzyme known as a branching enzyme is used. A branching enzyme attaches a string of seven glucose units to the sixth carbon of a glucose unit, usually in an interior location of the glycogen molecule.

This enzyme belongs to the family of transferases, specifically those glycosyltransferases that transfer hexoses (hexosyltransferases). The systematic name of this enzyme class is 1,4-alpha-D-glucan:1,4-alpha-D-

glucan 6-alpha-D(1,4-alpha-D-glucano)-transferase. Other names in common use include branching enzyme,...."

In addition, the online-medical-dictionary (also discussed in the last response) defines the branching enzyme or 1,4-alpha-Glucan Branching Enzyme as follows:

"In glycogen or amylopectin synthesis, the enzyme that catalyzes the transfer of a segment of a 1,4-alpha-glucan chain to a primary hydroxy group in a similar glucan chain. EC 2.4.1.18."

Thus, as noted in a previous response, the reference to EC 2.4.1.18 shows that the term branching enzyme is well known by its effect and is a generic term, irrespective of its source.

Again, what is important is the technical effect of the branching enzyme, i.e., the side branching of additional chains of glucose units. Thus, Applicants submit that the process for preparing the branching enzyme and the original source of the branching enzyme have no major importance in the claimed method.

As argued in the last response, the terms 1,4- $\alpha$ -glucan branching enzyme, branching enzyme, EC2.4.1.18 enzyme, etc. are considered to be equivalent and well known terms. As such, it is believed that term "branching enzyme" is a conventional and readily obtainable material/reagent used in the process like HCl or water. It has official nomenclatures: such as official IUBMB Enzyme Nomenclature: EC2.4.1.18 enzyme. Thus, the process for preparing the branching enzyme and the original source of the branching enzyme are thus irrelevant in

the instant case. Again, what is important is the technical effect of the branching enzyme, *i.e.*, the side branching of additional chains of glucose units (EC2.4.1.18. effect).

Applicants have drafted the new claims 38-44 to be consistent with the above discussion and the noted EC2.4.1.18. effect. It is believed that new claim 38 (added in the after final response) and new claims 39-44 should not be included in this rejection, because these claims further limit the purified branching enzymes by structure and function.

New independent claim 38 corresponds to the process of claim 19, but further specifies that "the purified branching enzyme is one selected from the group consisting of the branching enzyme of *E. coli*, the branching enzyme of *C. reinhardtii* and the branching enzyme of maize." New claim 38 also specifies that the purified branching enzyme must have the functional property such that "result branched polymers of glucose thus obtained are collected, wherein the branched polymers of glucose comprise, at every 10 to 14 glucose units, an additional chain of glucose units" (element c). As previously argued, the specification provides examples of the glycogen branching enzyme of *E. coli*, the branching enzyme of green algae *C. reinhardtii*, and the branching enzyme of maize.

New dependent claims 40, 41, 43, and 44 also further define and limit the branching enzyme. New dependent claim 41 further defines the purified branching enzymes by the official

IUBMB Enzyme Conventional nomenclature EC 2.4.1.18 as discussed above. The branching enzymes used in the specification are EC 2.4.1.18 branching enzymes.

The specification starting at page 15 provides more than sufficient details in this respect. As previously argued in pages 12-15 of the after final response, what is important is the technical effect of the branching enzyme, i.e., the side branching of additional chains of glucose units (this is known as the EC 2.4.1.18 effect). The specification clearly discloses selecting conventional branching enzymes to produce a specific product, "wherein the branched polymers of glucose comprise, at every 10 to 14 glucose units, an additional chain of glucose units" as claimed. Accordingly, any purified branching enzyme known to have this effect (i.e., any EC 2.4.1.18 enzyme) may be used in the claimed process.

New independent claim 42 is even narrower in that it is a combination of claims 19, 31, and 39.

Applicants respectfully submit that the enablement rejection should not apply to the new claims, since they further limit the purified branching enzyme by structure and function. There is explicit and implicit support for such in the disclosure, for example, at page 14, line 2 to page 16, line 20, and the Examples 1-4 on pages 17-24. Thus, the amended and new claims are limited to specific types of purified branching enzymes and not every possible purified branching enzyme. It is

believed that the skilled artisan could readily test for and identify purified branching enzymes having the required structural and functional properties using routine procedures and techniques as disclosed in the specification and without undue experimentation and then use such in the claimed process to arrive at the desired result. Thus, at the very least, it is believed that the enablement rejection should not apply to the narrower embodiments of the new claims. Applicants are considering a Rule 132 Declaration to further support the traversal to the enablement rejection.

The prior art rejections are traversed for the reasons set forth in the after final response.

There being no further outstanding matters, allowance of all the claims is solicited. If the Examiner has any proposals for expediting allowance, please contact the undersigned at the telephone number listed below.

Please charge payment or credit any overpayment to  
Deposit Account No. 25-0120 for any additional fees required  
under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17.

Respectfully submitted,

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